# UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/621,862 | 07/17/2003 | Jan Boer | 6-2-2-5 | 1756 |

7590          10/16/2008

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| EXAMINER |
|---|
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| ART UNIT | PAPER NUMBER |
|---|---|
| 2611 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 10/16/2008 | PAPER |

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# BEFORE THE BOARD OF PATENT APPEALS
# AND INTERFERENCES

Application Number: 10/621,862
Filing Date: July 17, 2003
Appellant(s): BOER ET AL.

Wayne Ellenbogen
For Appellant

## EXAMINER'S ANSWER

This is in response to the appeal brief filed on 09/22/2008 appealing from the Office

action mailed 04/02/2008.

**(1) Real Party in Interest**

A statement identifying the real party of interest is contained in the brief.

**(2) Related Appeals and Interferences**

A statement identifying by name the real party in interest is contained in the brief.

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellants' statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellants' statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

| 2004/0047296 | Tzannes et al. | 03-2004 |
| 6,522,696 | Mobin et al. | 02-2003 |

6,215,827     Balachandran et al.    04-2001

2003/0157914    Li et al.       08-2003

2005/0130595    Shurvinton et al.    06-2005

EP 1367752     Sano et al.      12-2003


## (9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 5, 12-14, 16, 17, 25, 28, 33, and 38 are rejected under 35 U.S.C.

103(a) as being unpatentable over Sano (EP 1367752 (see the IDS cited by the

Applicant)), in view of Tzannes et al. (hereafter, referred as Tzannes) (US

2004/0047296).

As to claim 1, Sano discloses a method for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), the method comprising the steps of: receiving a signal from the wireless

communication channel (see Fig. 1), the received signal comprising at least one field

(i.e. the common pilot portion); generating at least one reference field (see the outputs

of the fading compensation blocks) based, at least in part, on the at least one field in the

received signal (see the outputs of the delay unit) and on a channel estimation signal

(see the outputs of the channel estimator) (see Fig. 1 and column 6, lines 44-48, see

the output of the ), the channel estimation signal being distinct from the received signal

and representative of at least one characteristic of the wireless communication channel

(i.e. the SIR); and generating a signal quality estimate (see the outputs of the SIR

calculator blocks) as a function of the at least one field in the received signal (i.e. the

delayed version of the field) and the generated at least one reference field (column 6,

lines 48-58). Sano discloses all the subject matters claimed in claim 1, except that the

field is modulated and encoded in a substantially fixed manner. Tzannes discloses a

communication system, comprising two transceivers, wherein the second transceiver

returns to the first transceiver a positive acknowledgement that may or may not

comprise optimized communication parameters (see paragraph 0058). Tzannes

discloses that the packets communicated between transceivers comprise a header (i.e.

a signal field) to correctly determine the packer duration (see paragraph 0064). Tzannes

further discloses that the signal field is modulated according to the signal modulation

encoding parameters for the standard signal field, i.e. 6Mbps BPSK, code rate =1/2

(interpreted as modulation and encoding the field in a substantially fixed manner);

therefore, the receiver can correctly receive a signal field bits (see paragraph 0066). It

would have been obvious to one of ordinary skill in the art at the time of invention to use

a fixed modulated and encoding technique for at least one part of the packet as

suggested by Tzannes to ensure that the receiver can correctly receive the signal field

which contains the important timing information and as the result maximize the

communication data rate (see the abstract).

As to claim 5, Sano further discloses delaying of the at least one field in the received signal by an amount substantially equal to a latency associated with generating the at least one reference field (see column 6, lines 49-51).

As to claim 12, Tzannes discloses that at least a portion of the received signal is organized as an Institute of Electrical and Electronics Engineers (IEEE) standard 802.11 frame, the at least one field in the received signal comprising a SIGNAL field in the IEEE 802.11 frame (see paragraph 0066). It would have been obvious to one of ordinary skill in the art at the time of invention to allow the host to use different transmission rates by using the IEEE standard 802.11a and make the system more flexible.

As to claim 13, Sano further shows that channel estimation signal is obtained at least prior to generating the at least one reference field (i.e. outputs of the fading compensation unit) (see Fig. 1).

As to claim 14, Sano further shows that the received signal comprises at least one training symbol (i.e. the pilot symbol) and the channel estimation signal is computed based at least in part on the at least one training symbol in the received signal (see Fig. 1).

As to claim 16, Sano discloses a method for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), the method comprising the steps of: receiving a signal from the wireless communication channel (see Fig. 1), the received signal comprising at least one field (i.e. the common pilot portion); measuring at least one characteristic corresponding to

the at least one field in the received signal (i.e. measuring the signal to interference

ratio) (see column 5, lines 56-58); and generating a signal quality estimate (see the

outputs of the SIR blocks) as a function of the at least one field in the received signal

(i.e. the delayed version of the field) and the generated at least one reference field (see

the outputs of the fading compensation units, and column 6, lines 48-58). Sano

discloses all the subject matters claimed in claim 16, except that the field is modulated

and encoded in a substantially fixed manner. Tzannes discloses a communication

system, comprising two transceivers, wherein the second transceiver returns to the first

transceiver a positive acknowledgement that may or may not comprise optimized

communication parameters (see paragraph 0058). Tzannes discloses that the packets

communicated between transceivers comprise a header (i.e. a signal field) to correctly

determine the packer duration (see paragraph 0064). Tzannes further discloses that the

signal field is modulated according to the signal modulation encoding parameters for the

standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and

encoding the field in a substantially fixed manner); therefore, the receiver can correctly

receive a signal field bits (see paragraph 0066). It would have been obvious to one of

ordinary skill in the art at the time of invention to use a fixed modulated and encoding

technique for at least one part of the packet as suggested by Tzannes to ensure that the

receiver can correctly receive the signal field which contains the important timing

information and as the result maximize the communication data rate (see the abstract).

As to claim 17, Sano discloses that characteristic comprises signal to interference ratio (or signal to noise ratio) of the at least one field in the received signal (see column 5, lines 56-58).

As to claim 25, Sano discloses an apparatus for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), for generating at least one reference field (see the outputs of the fading compensation units) (inherently by using a controller) based, at least in part, on the at least one field and on a channel estimation signal (see Fig. 1 and column 6, lines 44-48), the channel estimation signal being distinct from the received signal and representative of at least one characteristic of the wireless communication channel (i.e. the SIR); and generating a signal quality estimate (see the outputs of the SIR blocks) as a function of the at least one field in the received signal (i.e. the delayed version of the field) and the generated at least one reference field (see the outputs of the fading compensation, and column 6, lines 48-58). Sano discloses all the subject matters claimed in claim 25, except that the field is modulated and encoded in a substantially fixed manner. Tzannes discloses a communication system, comprising two transceivers, wherein the second transceiver returns to the first transceiver a positive acknowledgement that may or may not comprise optimized communication parameters (see paragraph 0058). Tzannes discloses that the packets communicated between transceivers comprise a header (i.e. a signal field) to correctly determine the packer duration (see paragraph 0064). Tzannes further discloses that the signal field is modulated according to the signal modulation encoding parameters for the standard

signal field, i.e., 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding

the field in a substantially fixed manner); therefore, the receiver can correctly receive

signal field bits (see paragraph 0066). It would have been obvious to one of ordinary

skill in the art at the time of invention to use a fixed modulated and encoding technique

for at least one part of the packet as suggested by Tzannes to ensure that the receiver

can correctly receive the signal field which contains the important timing information and

as the result maximize the communication data rate (see the abstract).

As to claim 28, Sano further discloses that the step of delaying the at least one

field in the received signal by an amount substantially equal to a latency associated with

generating the at least one reference field (see column 6, lines 49-51).

As to claim 33, Sano further shows that channel estimation signal is obtained at

least prior to generating the at least one reference field (i.e. output of the fading

compensation units) (see Fig. 1).

As to claim 38, Sano discloses an apparatus for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), for generating at least one reference field (inherently by using a controller)

based, at least in part, on the at least one field and on a channel estimation signal (see

Fig. 1 and column 6, lines 44-48), the channel estimation signal being distinct from the

received signal representative of at least one characteristic of the wireless

communication channel (i.e. the SIR); and generating a signal quality estimate (See the

outputs of the SIR blocks) as a function of the at least one field in the received signal

(i.e. the delayed version of the field) and the generated at least one reference field (see

the outputs of the fading compensation units and column 6, lines 48-58). Sano discloses

all the subject matters claimed in claim 38, except that the field is modulated and

encoded in a substantially fixed manner. Tzannes discloses a communication system,

comprising two transceivers, wherein the second transceiver returns to the first

transceiver a positive acknowledgement that may or may not comprise optimized

communication parameters (see paragraph 0058). Tzannes discloses that the packets

communicated between transceivers comprise a header (i.e. a signal field) to correctly

determine the packer duration (see paragraph 0064). Tzannes further discloses that the

signal field is modulated according to the signal modulation encoding parameters for the

standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and

encoding the field in a substantially fixed manner); therefore, the receiver can correctly

receive a signal field bits (see paragraph 0066). It would have been obvious to one of

ordinary skill in the art at the time of invention to use a fixed modulated and encoding

technique for at least one part of the packet as suggested by Tzannes to ensure that the

receiver can correctly receive the signal field which contains the important timing

information and as the result maximize a communication data rate (see the abstract).

Claims 2-4, 6, 26, 27, 29, and 34 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Sano and Tzannes, further in view of Mobin et al. (hereafter, referred

as Mobin) (US 6,522,696).

As to claims 2 and 26, Sano and Tzannes disclose all the subject matters

claimed in claims 1 and 25, except that the step of generating the signal quality estimate

comprises measuring a difference between one or more constellation points associated

with the at least one reference field and one or more corresponding constellation points

associated with the at least one field in the received signal. Mobin discloses a method

for determining channel estimation in a communication system (see the abstract). Mobin

further discloses that a viterbi decoder 114 determines the branch metric quality based

on measuring a difference between one or more constellation points associated with the

at least one reference field (e.g. I' and Q') and one or more corresponding constellation

points associated with the at least one field in the received signal (e.g. I and Q) (see

column 10, lines 19-32). It would have been obvious to one of ordinary skill in the art at

the time of invention to modify Sano and Tzannes as suggested by Mobin in order to

reduce frequency offset errors in a communication system (see column 1, last

paragraph).

As to claim 3, Mobin further discloses that the measured difference comprises a

Euclidean distance (see column 10, line 28). It would have been obvious to one of

ordinary skill in the art at the time of invention to modify Sano and Tzannes as

suggested by Mobin to reduce frequency offset errors in a communication system (see

column 1, last paragraph).

As to claims 4 and 27, Mobin further disclose that the step of generating the

signal quality estimate comprises the steps of: aligning the one or more constellation

points associated with the at least one field in the received signal with the one or more

corresponding constellation points associated with the at least one reference field; and

generating difference signals for each of at least a portion of samples in the at least one

field in the received signal, each of the difference signals being representative of a

difference between the at least one field in the received signal and the corresponding at least one reference field (see column 10, lines 12-35). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a communication system (see column 1, last paragraph).

As to claims 6 and 29, Sano and Tzannes disclose all the subject matters claimed in claims 1 and 25, except for generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and determining a magnitude of the difference signal, the signal quality estimate being a function of the magnitude of the difference signal. Mobin discloses generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field (see column 10, lines 12-35); and determining a magnitude of the difference signal (see column 10, line 28), the signal quality estimate being a function of the magnitude of the difference signal (see line 30). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a communication system (see column 1, last paragraph).

As to claim 34, Sano discloses an apparatus for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), for generating at least one reference field based (i.e. the outputs of the fading compensation units) (inherently by using a processor), at least in part, on the at least one field and on a channel estimation signal (see Fig. 1 and column 6, lines 44-

48), the channel estimation signal being distinct from the received signal and

representative of at least one characteristic of the wireless communication channel (i.e.

the SIR). Sano discloses all the subject matters claimed in claim 34, except that the field

is modulated and encoded in a substantially fixed manner. Sano also does not disclose

a comparator for generating a signal quality estimate as a function of the at least one

field in the received signal and the generated at least one reference field. As to the first

limitation, Tzannes discloses a communication system, comprising two transceivers,

wherein the second transceiver returns to the first transceiver a positive

acknowledgement that may or may not comprise optimized communication parameters

(see paragraph 0058). Tzannes discloses that the packets communicated between

transceivers comprise a header (i.e. a signal field) to correctly determine the packer

duration (see paragraph 0064). Tzannes further discloses that the signal field is

modulated according to the signal modulation encoding parameters for the standard

signal field, i.e., 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding

the field in a substantially fixed manner); therefore, the receiver can correctly receive a

signal field bits (see paragraph 0066). It would have been obvious to one of ordinary

skill in the art at the time of invention to use a fixed modulated and encoding technique

for at least one part of the packet as suggested by Tzannes to ensure that the receiver

can correctly receive the signal field which contains the important timing information and

as the result maximize a communication data rate (see the abstract). As to the second

limitation, Mobin discloses a method for determining channel estimation in a

communication system (see the abstract). Mobin further discloses that a viterbi decoder

114 determines the branch metric quality based on measuring a difference between one

or more constellation points associated with the at least one reference field (e.g. I' and

Q') and one or more corresponding constellation points associated with the at least one

field in the received signal (e.g. I and Q) (see column 10, lines 19-32). It would have

been obvious to one of ordinary skill in the art at the time of invention to modify Sano

and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a

communication system (see column 1, last paragraph).

Claims 7-9, 30, and 31 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Sano, Tzannes, Mobin, further in view of Balachandran et al.

(hereafter, referred as Balachandran) (US 6,215,827).

As to claims 7 and 30, Sano, Tzannes and Mobin disclose all the subject matters

claimed in claims 6 and 29, except averaging at least a portion of magnitudes of

difference signals corresponding to a plurality of samples in the at least one field in the

received signal, each of the difference signals being representative of a difference

between the at least one field in the received signal and the at least one reference field

for a given one of the samples, the signal quality estimate being a function of the

averaged magnitudes. Balachandran, in the same field on endeavor, discloses a system

and method to measure channel quality in terms of signal to interference ratio (see the

abstract). Balachandran further discloses using weighted (i.e. averaged) Euclidean

distance metric as SIR metric (see column 7, lines 63).  It would have been obvious to

one of ordinary skill in the art at the time of invention to average magnitude of the

difference signal to obtain a good estimated of the metric as suggested by

Balachandran (see column 7, lines 52-53 and 61-63).

As to claims 8 and 31, Balachandran shows that the averaging step comprises adding a magnitude value corresponding to a present sample in the at least one field in the received signal to a magnitude value corresponding to a previous sample in the at least one field in the received signal (see column 7, lines 35-63). It would have been obvious to one of ordinary skill in the art at the time of invention to average magnitude of the difference signal to obtain a good estimated of the metric as suggested by Balachandran (see column 7, lines 52-53 and 61-63).

As to claim 9, Tzannes discloses uses SIGNAL field header in the packet (see paragraph 0066). According to the IEEE 802.11a standard, inherently this SIGNAL field contains 48 bits.

Claims 10 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sano, Tzannes, Mobin, further in view of Li et al. (hereafter, referred as Li) (US 2003/0157914).

As to claims 10 and 32, Sano and Tzannes disclose all the subject matters claimed in claims 1 and 25, except for generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and determining a magnitude of the difference signal, the signal quality estimate being a function of the magnitude of the difference signal. Mobin discloses generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field (see column 10, lines 12-35); and determining a magnitude of the difference signal (see column 10, line 28), the

signal quality estimate being a function of the magnitude of the difference signal (see line 30). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as suggested by Mobin to reduce frequency offset errors in a communication system (see column 1, last paragraph). Sano, Tzannes and Mobin disclose all the subject matters claimed in claims 10 and 32, except that instead of measuring the magnitude of the difference signal, power of the difference signal could be measured. Li discloses a communication apparatus wherein the residual interfering signal is removed to improve the quality of the received signal (see the abstract). Li further discloses that the reception quality of the signal is continuously monitored by checking the power or amplitude of each sub-band signal (see paragraph 0025). Since it is well known in the art that it is easier to measure the power of the incoming signal instead of its magnitude; therefore it would have been obvious to one of ordinary skill in the art at the time of invention to measure power of the incoming signal to make the system more cost effective.

Claims 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sano, Tzannes, Mobin, Li, further in view of Balachandran.

As to claim 11, Sano, Tzannes, Mobin and Li disclose all the subject matters claimed in claim 10, except averaging at least a portion of magnitudes of difference signals corresponding to a plurality of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the at least one reference field for a given one of the samples, the signal quality estimate being a function of the averaged magnitudes.

Balachandran discloses a system and method to measure channel quality in terms of

signal to interference ratio (see the abstract). Balachandran further discloses using

weighted (i.e. averaged) Euclidean distance metric as SIR metric (see column 7, lines

63). It would have been obvious to one of ordinary skill in the art at the time of invention

to average magnitude of the difference signal to obtain a good estimated of the metric

as suggested by Balachandran (see column 7, lines 52-53 and 61-63). As already

disclosed in rejection of claim 10, Li discloses that the reception quality of the signal is

continuously monitored by checking the power or amplitude of each sub-band signal

(see paragraph 0025). Since it is well known in the art that it is easier to measure the

power of the incoming signal instead of its magnitude; therefore it would have been

obvious to one of ordinary skill in the art at the time of invention to measure power of

the incoming signal to make the system more cost effective.

Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sano

and Tzannes, further in view of Balachandran.

As to claims 15, Sano shows that the received signal comprises a second field

(i.e. a data field) (see Fig. 4), however, Sano and Tzannes fail to disclose that the

second field having a variable modulation and encoding, and changing at least one of

the modulation and the encoding of the second field based, at least in part, on the signal

quality estimate. Balachandran, in the same field of endeavor, discloses a

communication system apparatus comprising an encoded and modulation decision unit

258, which determines the correct encoding and modulation scheme in response to the

received SIR estimate 274 from the receiver 261 (see column 14, lines 7-16).

Balachandran further discloses that the <u>adaptive</u> channel encoder and modulator 256

then encodes and modulates the transmit data stream 252 to a predetermined scheme

and transmits the information (interpreted as data) through the channel. It would have

been obvious to one of ordinary skill in the art at the time of invention to adaptively

change the transmission rate based on the feedbacks from the receiver to improve the

efficiency of the system as suggested by Balachandran (see column 1, lines 25-38).

Claims 18-20, 23, 24, and 37 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Sano, Tzannes, and Mobin, further in view of Balachandran.

As to claim 18, Sano discloses a method for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), the method comprising the steps of: receiving a signal from the wireless

communication channel (see Fig. 1), the received signal comprising at least one field

(i.e. the common pilot portion); generating at least one reference field (see the outputs

of the fading compensation units) based, at least in part, on the at least one field in the

received signal and on a channel estimation signal (see Fig. 1 and column 6, lines 44-

48), the channel estimation signal being distinct from the received signal and

representative of at least one characteristic of the wireless communication channel (i.e.

the SIR). Sano discloses all the subject matters claimed in claim 18, except that the field

is modulated and encoded in a substantially fixed manner. Sano also does not disclose

comparing the at least one field in the received signal with the at least one reference

field and generating a difference signal corresponding thereto; generating a signal

quality estimate as a function of the difference signal; and modifying the data

transmission rate of the transmitter based on the signal quality estimate. As to the first

limitation, Tzannes discloses a communication system, comprising two transceivers,

wherein the second transceiver returns to the first transceiver a positive

acknowledgement that may or may not comprise optimized communication parameters

(see paragraph 0058). Tzannes discloses that the packets communicated between

transceivers comprise a header (i.e. a signal field) to correctly determine the packer

duration (see paragraph 0064). Tzannes further discloses that the signal field is

modulated according to the signal modulation encoding parameters for the standard

signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding

the field in a substantially fixed manner); therefore, the receiver can correctly receive a

signal field bits (see paragraph 0066). It would have been obvious to one of ordinary

skill in the art at the time of invention to use a fixed modulated and encoding technique

for at least one part of the packet as suggested by Tzannes to ensure that the receiver

can correctly receive the signal field which contains the important timing information and

as the result maximize a communication data rate (see the abstract). As to the second

limitation, Mobin discloses a method for determining channel estimation in a

communication system (see the abstract). Mobin further discloses that a viterbi decoder

114 determines the branch metric quality based on measuring a difference between one

or more constellation points associated with the at least one reference field (e.g. I' and

Q') and one or more corresponding constellation points associated with the at least one

field in the received signal (e.g. I and Q) (see column 10, lines 19-32). It would have

been obvious to one of ordinary skill in the art at the time of invention to modify Sano

and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a

communication system (see column 1, last paragraph). Sano, Tzannes, and Mobin

disclose all the subject matters claimed in claim 18, except for modifying the data

transmission rate of the transmitter based, at least in part, on the signal quality estimate.

Balachandran, in the same field of endeavor, discloses a communication system

apparatus comprising an encoded and modulation decision unit 258, which determines

the correct encoding and modulation scheme in response to the received SIR estimate

274 from the receiver 261 (see column 14, lines 7-16). Balachandran further discloses

that the adaptive channel encoder and modulator 256 then encodes and modulates the

transmit data stream 252 to a predetermined scheme and transmits the information

(interpreted as data) through the channel. It would have been obvious to one of ordinary

skill in the art at the time of invention to adaptively change the transmission rate based

on the feedbacks from the receiver to improve the efficiency of the system as suggested

by Balachandran (see column 1, lines 25-38).

As to claim 23, Sano discloses a method for estimating a signal quality (i.e.

estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6,

lines 56-58), the method comprising the steps of: receiving a signal from the wireless

communication channel (see Fig. 1), the received signal comprising at least one field

(i.e. the common pilot portion); measuring at least one characteristic corresponding to

the at least one field in the received signal (i.e. measuring the signal to interference

ratio) (see column 5, lines 56-58). Sano discloses all the subject matters claimed in

claim 23, except that the field is modulated and encoded in a substantially fixed manner.

Sano also does not disclose generating a signal quality estimate as a function of the

difference between the at least one characteristic corresponding to the first field in the

received signal and at least one threshold corresponding to the at least one

characteristic; and modifying at least one of the modulation and encoding of the second

field base on the signal quality estimate. Tzannes discloses a communication system,

comprising two transceivers, wherein the second transceiver returns to the first

transceiver a positive acknowledgement that may or may not comprise optimized

communication parameters (see paragraph 0058). Tzannes discloses that the packets

communicated between transceivers comprise a header (i.e. a signal field) to correctly

determine the packer duration (see paragraph 0064). Tzannes further discloses that the

signal field is modulated according to the signal modulation encoding parameters for the

standard signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and

encoding the field in a substantially fixed manner); therefore, the receiver can correctly

receive a signal field bits (see paragraph 0066). It would have been obvious to one of

ordinary skill in the art at the time of invention to use a fixed modulated and encoding

technique for at least one part of the packet as suggested by Tzannes to ensure that the

receiver can correctly receive the signal field which contains the important timing

information and as the result maximize a communication data rate (see the abstract). As

to the second limitation, Mobin discloses a method for determining channel estimation in

a communication system (see the abstract). Mobin further discloses that the sub-frame

bit error quality indication signal or channel quality indication signal corresponds to the

number of mismatches in the bits (interpreted as one characteristic of the received

signal) received form the channel encoder 44 and deinterleaver 36, or alternatively

equalizer 34. Mobin further discloses that the quality signal is declared acceptable by

automatic frequency correction unit 58, if the bit error count over a speech frame is

below a predetermined threshold (see column 7, lines 12, 13, and 33-39). It would have

been obvious to one of ordinary skill in the art at the time of invention to modify Sano

and Tzannes as suggested by Mobin in order to reduce frequency offset errors in a

communication system (see column 1, last paragraph). Sano, Tzannes, and Mobin

disclose all the subject matters claimed in claim 23, except for modifying the data

transmission rate of the transmitter based, at least in part, on the signal quality estimate.

Balachandran, in the same field of endeavor, discloses a communication system

apparatus comprising an encoded and modulation decision unit 258, which determines

the correct encoding and modulation scheme in response to the received SIR estimate

274 from the receiver 261 (see column 14, lines 7-16). Balachandran further discloses

that the adaptive channel encoder and modulator 256 then encodes and modulates the

transmit data stream 252 to a predetermined scheme and transmits the information

(interpreted as data) through the channel. As to the limitation regarding a second field in

the data packet; Sano shows that the received signal comprises a second field (i.e. a

data field) (see Fig. 4), however, Sano, Tzannes, and Mobin fail to disclose that the

second field having a variable modulation and encoding, and changing at least one of

the modulation and the encoding of the second field based, at least in part, on the signal

quality estimate. Balachandran further discloses that the adaptive channel encoder and

modulator 256 then encodes and modulates the transmit data stream 252 to a

predetermined scheme and transmits the information (interpreted as data or second field of data packet) through the channel. It would have been obvious to one of ordinary skill in the art at the time of invention to adaptively change the transmission rate based on the feedbacks from the receiver to improve the efficiency of the system as suggested by Balachandran (see column 1, lines 25-38).

As to claim 24, Sano discloses that characteristic comprises signal to interference ratio (or signal to noise ratio) of the at least one field in the received signal (see column 5, lines 56-58).

As to claim 37, Sano discloses an apparatus for estimating a signal quality (i.e. estimation of the signal to interference ratio (SIR)) in a wireless system (see column 6, lines 56-58), for generating at least one reference field (see the output of the fading compensation units) (inherently by using a controller) based, at least in part, on the at least one field and on a channel estimation signal (see Fig. 1 and column 6, lines 44-48), the channel estimation signal being distinct from the received signal and representative of at least one characteristic of the wireless communication channel (i.e. the SIR). Sano discloses all the subject matters claimed in claim 37, except that the field is modulated and encoded in a substantially fixed manner. Sano also does not disclose generating a signal quality estimate by comparing the at least one field in the received signal and the generated at least one reference field and to generate a difference signal, and modifying the data transmission rate of the transmitter based on the signal quality estimate. Tzannes discloses a communication system, comprising two transceivers, wherein the second transceiver returns to the first transceiver a positive

acknowledgement that may or may not comprise optimized communication parameters
(see paragraph 0058). Tzannes discloses that the packets communicated between
transceivers comprise a header (i.e. a signal field) to correctly determine the packer
duration (see paragraph 0064). Tzannes further discloses that the signal field is
modulated according to the signal modulation encoding parameters for the standard
signal field, i.e. 6Mbps BPSK, code rate =1/2 (interpreted as modulation and encoding
the field in a substantially fixed manner); therefore, the receiver can correctly receive a
signal field bits (see paragraph 0066). It would have been obvious to one of ordinary
skill in the art at the time of invention to use a fixed modulated and encoding technique
for at least one part of the packet as suggested by Tzannes to ensure that the receiver
can correctly receive the signal field which contains the important timing information and
as the result maximize a communication data rate (see the abstract). As to the second
limitation, Mobin further discloses that a viterbi decoder 114 determines the branch
metric quality based on measuring a difference between one or more constellation
points associated with the at least one reference field (e.g. I' and Q') and one or more
corresponding constellation points associated with the at least one field in the received
signal (e.g. I and Q) (see column 10, lines 22-32). It would have been obvious to one of
ordinary skill in the art at the time of invention to modify Sano and Tzannes as
suggested by Mobin in order to reduce frequency offset errors in a communication
system (see column 1, last paragraph). Sano, Tzannes, and Mobin disclose all the
subject matters claimed in claim 37, except for modifying the data transmission rate of
the transmitter based, at least in part, on the signal quality estimate. Balachandran, in

the same field of endeavor, discloses a communication system apparatus comprising an encoded and modulation decision unit 258, which determines the correct encoding and modulation scheme in response to the received SIR estimate 274 from the receiver 261 (see column 14, lines 7-16). Balachandran further discloses that the adaptive channel encoder and modulator 256 then encodes and modulates the transmit data stream 252 to a predetermined scheme and transmits the information (interpreted as data) through the channel. It would have been obvious to one of ordinary skill in the art at the time of invention to adaptively change the transmission rate based on the feedbacks from the receiver to improve the efficiency of the system as suggested by Balachandran (see column 1, lines 25-38).

As to claim 19, Mobin further discloses that viterbi decoder 114 determines the branch metric quality based on measuring a difference between one or more constellation points associated with the at least one reference field (e.g. I' and Q') and one or more corresponding constellation points associated with the at least one field in the received signal (e.g. I and Q) (see column 10, lines 19-32). It would have been obvious to one of ordinary skill in the art at the time of invention to modify Sano, Tzannes, and Balachandran as suggested by Mobin in order to reduce frequency offset errors in a communication system (see column 1, last paragraph).

As to claim 20, Mobin further disclose that the step of generating the signal quality estimate comprises the steps of: aligning the one or more constellation points associated with the at least one field in the received signal with the one or more corresponding constellation points associated with the at least one reference field; and

generating difference signals for each of at least a portion of samples in the at least one

field in the received signal, each of the difference signals being representative of a

difference between the at least one field in the received signal and the corresponding at

least one reference field (see column 10, lines 12-35). It would have been obvious to

one of ordinary skill in the art at the time of invention to modify Sano and Tzannes as

suggested by Mobin to reduce frequency offset errors in a communication system (see

column 1, last paragraph).

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Sano, Tzannes, Mobin, and Balachandran, further in view of Li.

As to claim 21, Mobin discloses generating a difference signal representative of a

difference between the at least one field in the received signal and the at least one

reference field (see column 10, lines 12-35); and determining a magnitude of the

difference signal (see column 10, line 28), the signal quality estimate being a function of

the magnitude of the difference signal (see line 30). It would have been obvious to one

of ordinary skill in the art at the time of invention to modify Sano, Tzannes and

Balachandran as suggested by Mobin to reduce frequency offset errors in a

communication system (see column 1, last paragraph). Sano, Tzannes, Balachandran

and Mobin disclose all the subject matters claimed in claim 21, except that instead of

measuring the magnitude of the difference signal, power of the difference signal could

be measured. Li discloses a communication apparatus wherein the residual interfering

signal is removed to improve the quality of the received signal (see the abstract). Li

further discloses that the reception quality of the signal is continuously monitored by

checking the power or amplitude of each sub-band signal (see paragraph 0025). Since

it is well known in the art that it is easier to measure the power of the incoming signal

instead of its magnitude; therefore it would have been obvious to one of ordinary skill in

the art at the time of invention to measure power of the incoming signal to make the

system more cost effective.

As to claim 22, Balachandran, further discloses using weighted (i.e. averaged)

Euclidean distance metric as SIR metric (see column 7, lines 63). It would have been

obvious to one of ordinary skill in the art at the time of invention to average magnitude

of the difference signal to obtain a good estimate of the metric as suggested by

Balachandran (see column 7, lines 52-53 and 61-63). As already disclosed in rejection

of claim 10, Li discloses that the reception quality of the signal is continuously monitored

by checking the power or amplitude of each sub-band signal (see paragraph 0025).

Since it is well known in the art that it is easier to measure the power of the incoming

signal instead of its magnitude; therefore it would have been obvious to one of ordinary

skill in the art at the time of invention to measure power of the incoming signal to make

the system more cost effective.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sano,

Tzannes, Mobin, and Balachandran, further in view of Shurvinton et al. (hereafter,

referred as Shurvinton) (US 2005/0130595).

As to claim 36, Sano, Tzannes, and Mobin, disclose all the subject matters

claimed in claim 34, except an integrator coupled to the comparator, the integrator being

configurable for averaging at least a portion of magnitudes of difference signals

corresponding to a plurality of samples in the at least one field in the received signal,

each of the difference signals being representative of a difference between the at least

one field in the received signal and the at least one reference field for a given one of the

samples, the signal quality estimate being a function of the averaged magnitudes.

Balachandran, in the same field on endeavor, discloses a system and method to

measure channel quality in terms of signal to interference ratio (see the abstract).

Balachandran further discloses using weighted (i.e. averaged) Euclidean distance

metric as SIR metric (see column 7, lines 63).  It would have been obvious to one of

ordinary skill in the art at the time of invention to average magnitude of the difference

signal to obtain a good estimated of the metric as suggested by Balachandran (see

column 7, lines 52-53 and 61-63). Sano, Tzannes, Mobin, and Balachandran disclose

all the subject matters claimed in claim 36, except that an integrator is used to perform

the averaging function. Shurvinton discloses a communication device comprising an

integrator 21, which has been used to average out the amplitude variations of the

incoming signal (see paragraph 0067). It would have been obvious to one of ordinary

skill in the art at the time of invention to use an integrator to determine the average of

the magnitude to reduce the error in the sampled power measurement as suggested by

Shurvinton (see paragraph 0067).


### *Allowable Subject Matter*
Claim 35 allowed. The following is a statement of reasons for the indication of

allowable subject matter: a comprehensive search of prior art of record failed to

disclose, either alone or in combination, a circuit for estimating a signal quality of a

signal received from a wireless communication channel, the received signal comprising

at least one field that is modulated and encoded in a substantially fixed manner, the

circuit comprising: a processor operative to generate at least one reference field based,

at least in part, on the at least one field in the received signal and on a channel

estimation signal, the channel estimation signal being representative of at least one

characteristic of the wireless communication channel; and a comparator coupled to the

processor, the comparator being configurable for generating a signal quality estimate as

a function of a difference between the at least one reference field and the at least one

field in the received signal; wherein the processor comprises: a slicer configurable for

receiving the at least one field in the received signal and recovering therefrom a plurality

of received symbol bits associated with the at least one field; a decoder configurable for

correcting one or more errors potentially present in the received symbol bits, the

corrected received symbol bits corresponding to originally transmitted symbol bits in the

at least one field; an encoder configurable for encoding the corrected received symbol

bits; a modulator configurable for converting the encoded corrected received symbol

bits to a baseband signal; and a multiplier configurable for combining the baseband

signal and the channel estimation signal and generating the at least one reference field

based at least in part on the baseband signal and on the channel estimation signal.

### (10) Response to Argument

#### (A) Introduction

Prior to responding to the arguments, the Examiner would like to describe the field of invention.

The invention relates to a method/apparatus for estimating a signal quality of a received signal, wherein the method for estimating the signal quality includes the steps of receiving a signal from a wireless communication channel, the received signal including at least one field that is modulated and encoded in a substantially fixed manner, and generating at least one reference field based, at least in part, on the at least one field and on a channel estimation signal. The channel estimation signal is representative of at least one characteristic of the wireless communication channel. The method further includes the step of generating a signal quality estimate as a function of the at least one field in the received signal and the generated at least one reference field.

(B) Response to Arguments

The Examiner discusses the claims in the same order as the Appellants.

Rejection of claims 1, 5, 12-14, 16, 17, 25, 28, 33, and 38 under §103(a) over Sano and Tzannes.

**Claims 1, 5, 12-14, 25, 33, and 38-**

Appellants state that "The examiner appears to be relying on, and misquoting from, a portion of MPEP 409.03(d) which states "[c]opies of documentary evidence such as internet searches, certified mail return receipts, cover letters of instructions, telegrams, that support a finding that the nonsigning inventor could not be found or reached should be made part of the statement."" Appellants further state that "Nowhere does MPEP 409.03(d) state that certified mail return receipts are required in order to show diligence. Indeed, MPEP 409.03(d) specifically states that certified mail return receipts are merely one example of documentary evidence which may be submitted in order to support a finding that the nonsigning inventor could not be found or reached; this documentary evidence may also include, for example, internet searches and/or cover letters of instructions." Examiner respectfully states that in the last office action dated as 06/25/2008, Examiner has cited three sections of MPEP as following: 605.03, 409.03(d) and 37 CFR 1.47. Based on the last section (37 CFR 1.47), the Applicants had to submit a petition including the proof that the nonsigning inventor could not be found after diligent effort, the fee set forth in § 1.17(g), and the last known address of the non-signing inventor. Since the Applicants failed to submit such a petition in compliance with rule 1.47, the Declaration has been considered but is ineffective to overcome the references used in the previous office action.

Furthermore, from MPEP section 37 CFR 1.47, it is clear that copies of

documentary evidence such as internet searches, certified mail return

receipts, cover letters of instructions, telegrams, that support a finding that

the nonsigning inventor could not be found or reached should be made

part of the statement. Appellants do not show any proof that the

nonsigning inventor could not be reached at his last mailing address.

There are no copies on the record to show Appellants have done any

internet searches to find the nonsigning inventor. Therefore, Examiner

states that the Declaration has been considered but is ineffective to

overcome the references used in the previous office action.

Appellants further state that limitations "generating at least one

reference field based, at least in part, on the at least one field in the

received signal and on a channel estimation signal, the channel estimation

signal being distinct from the received signal and representative of at least

one characteristics of the wireless communication channel" and

"generating the signal quality estimate by measuring a difference between

one or more constellation points associated with the at least one reference

field and one or more corresponding points associated with the at least

one field in the receiving signal", argued by the Examiner in final office

action mailed on 04/02/2008 and Advisory action mailed on 06/25/2008

have been explicitly described in Exhibit 1, at page 2, third paragraph, and

Exhibit 1, page 2, second paragraph, respectively. Regarding to the first

limitation, Examiner agrees with the Appellants. However regarding to the second limitation, Examiner states that since in Exhibits submitted by the Appellants, the definition of "reference" constellation point is not clear, Examiner is not certain if the "reference constellation point" disclosed in Appellants' exhibit is the same as the reference constellation point cited by the Appellants in claims of the instant Application. Therefore, in view of lack of any description for "reference" constellation points, Examiner respectfully disagrees with the Appellants' argument that there is support for this limitation in the submitted exhibits.

Appellants state that "because Appellants have established actual reduction to practice prior to the effective date of the reference, Appellants need not to establish conception". Examiner respectfully asserts that on page 1, of Declaration submitted by the Appellants, it has been noted that "The invention falling within the scope of the claims in the present application was conceived and reduced to practice at some time prior to March 12, 2001." Since Appellants have established actual reduction to practice, based on the definition and requirements of actual reduction to practice cited in MPEP 2138.05 II., a party seeking to establish an actual reduction to practice must satisfy a two-prong test: (1) the party constructed an embodiment or performed a process that met every element of the interference count, and (2) the embodiment or process operated for its intended purpose. Therefore to establish an actual

reduction to practice, the Declaration submitted by the Appellants must contain the details of the claimed subject matter.

Appellants, on pages 11 and 15, of the Appeal Brief state that "the Declaration is effective to remove Tzannes as §102(e) prior art and thus to overcome the present rejection". Examiner respectfully disagrees. Examiner states that for the reasons stated above, the Declaration is not effective to overcome any of the references used in the previous office actions.

Appellants state that "Sano fails to teach or suggest the claim limitation of generating a reference field based on a field of the received signal and on a distinct channel estimation signal." Examiner respectfully disagrees. Examiner states that Appellants in Fig. 3 of invention's disclosure show that a reference signal field has been generated by applying the effect of the channel on the received signal. Sano in Fig. 1, shows that the output of fading compensating section has been generated based on the effect of the communication channel on the delayed version of the received signal. Therefore, the output of fading compensating section has been interpreted by the Examiner as generated reference signal. Appellants further argue that the channel estimation signal disclosed by Sano is not distinct from the received signal. In view of lack of any description in the claim for signals being distinct, Examiner has interpreted the distinct signals as two separate signals. Moreover,

Appellants do not show how the channel estimation signal has been

generated. However, it is extremely well known in the art that channel

estimation signal must be generated at the receiver by using the received

signal. Therefore, it is not a valid argument that the channel estimation

signal can be generated without using the received signal.

Appellants state that "Sano also fails to teach or suggest the claim

limitation of "generating a signal quality estimate as a function of the at

least one field in the received signal and the generated at least one

reference field"". Examiner respectfully disagrees. Sano in Fig. 1 shows

that a signal quality estimate (see the output of SIR calculators) has been

generated as a function of the at least one field in the received signal (e.g.

the data field or the pilot field) (see the delay version of the received

signal) and the generated at least one reference field (see the outputs of

fading compensating sections).

**Claims 16 and 17-**

Appellants, on page 17, of the Appeal Brief state that "the

Declaration is effective to remove Tzannes as §102(e) prior art and thus to

overcome the present rejection". Examiner respectfully disagrees.

Examiner states that for the reasons stated above, the Declaration is not

effective to overcome any of the references used in the previous office

actions.

Appellants state that Sano fails to disclose limitation "measuring at least one characteristic corresponding to the at least one field in the received signal; and generating a signal quality estimate as a function of the at least one characteristic corresponding to the at least one field in the received signal." Examiner respectfully disagrees. Examiner states that Sano teaches measuring at least one characteristic corresponding to the at least one field in the received signal (i.e. measuring the signal to interference ratio of the received signal) (see column 5, lines 56-58); and generating a signal quality estimate (see the outputs of the SIR blocks) as a function of the at least one field in the received signal (i.e. the delayed version of the field) and the generated at least one reference field (see the outputs of the fading compensation units, and column 6, lines 48-58).

**Claims 2-4, 6, 26, 27, and 29-**

Appellants state that the Declaration is effective to remove Mobin as §102(a) prior art. Examiner states that, as explained above, in the previous section, the Declaration is not effective to overcome any of the references used in the previous office actions.

**Claim 34-**

Appellants state that "Sano fails to teach or suggest the claim limitation of generating a reference field based on a field of the received signal and on a distinct channel estimation signal." Examiner respectfully disagrees. Examiner states that Appellants in Fig. 3 of invention's

disclosure show that a reference signal field has been generated by applying the effect of the channel on the received signal. Sano in Fig. 1, shows that the output of fading compensating section has been generated based on the effect of the communication channel on the delayed version of the received signal. Therefore, the output of fading compensating section has been interpreted as generated reference signal. Appellants further argue that the channel estimation signal disclosed by Sano is not distinct from the received signal. In view of lack of any description in the claim for signals being distinct, Examiner has interpreted the distinct signals as two separate signals. Moreover, Appellants do not show how the channel estimation signal has been generated. However, it is extremely well known in the art that channel estimation signal must be generated at the receiver by using the received signal. Therefore, it is not a valid argument that the channel estimation signal can be generated without using the received signal.

Appellants state that Mobin fails to disclose limitation "generating a signal quality estimate as a function of the branch metric". Examiner respectfully states that Mobin in column 10, lines 19-21, discloses that an estimate of the received signal for each candidate state is employed in a process referred to, in this context, as branch metric processing. Therefore, Appellants' argument is not persuasive.

**Claims 7-9, 30, and 31-**

Appellants do not argue the individual limitations of dependent

claims 7-9, 30, and 31. Therefore the response to arguments for claims 7-

9, 30, and 31 are the same as the response to the arguments of their

independent claims.

**Claims 18-20 and 38-**

Appellants' argument, cited on page 21, lines 1-11, is the same as

Appellants argument for claims 1, 25, and 38. Therefore, Examiner's

response to this argument is the same as cited above, on pages 33 and

34.

Appellants' argument, cited on page 21, lines 12-16, is the same as

Appellants' argument for claim 34. Therefore, Examiner's response to this

argument is the same as cited above, on the previous page.

**Claims 10 and 32-**

Appellants do not argue the individual limitations of dependent

claims 10 and 32. Therefore the response to arguments for claims 10 and

32 are the same as the response to the arguments of their independent

claims.

**Claim 11-**

Appellants state that the Declaration filed is effective to remove Li,

from consideration and this overcome the present rejection. Examiner

respectfully states that for the reasons state above the Declaration cited

by the Appellants is not effective to overcome any of the references used in the previous office actions.

**Claim 15-**

Appellants do not argue the individual limitations of dependent claim 15. Therefore the response to arguments for claim 15 is the same as the response to the arguments of claim 1.

**Claim 21 and 22-**

Appellants argue that in rejection of claims 21 and 22, "there is insufficient objective motivation to combine the references cited by the Examiner, as well as lack of reasonable expectation of success in doing so. Specifically, the Examiner appears to be engaging in hindsight-based piecemeal analysis." Examiner states that regarding to the combination of Sano, Tzannes, Balachandran, with Mobin, as cited in the previous office action, the motivation to combine these references is to reduce the frequency offset error. By modifying Sano as suggested by Mobin a more accurate signal quality measurement can be achieved. Regarding reference Li, all the other references teach all the limitations of claim 21, except that instead of measuring the magnitude of the difference signal, power of the difference signal could be measured. Even without using reference Li, this limitation is extremely well known in the art, because it is usually easier to measure the power of the incoming signal instead of its magnitude. Therefore, it would have been obvious to one of ordinary skill

in the art at the time of invention to measure power of the incoming signal
to make the system more cost effective.

**Claim 36-**

Appellants state that Declaration filed is effective to remove
Shurvinton, from consideration and this overcomes the present rejection.
Examiner respectfully states that for the reasons state above the
Declaration cited by the Appellants is not effective to overcome any of the
references used in the previous office actions.

Appellants further state that there is insufficient objective motivation
to combine Shurvinton with the rest of references cited by the Examiner,
as well as lack of reasonable expectation of success in doing so.
Examiner asserts that Sano, Tzannes, Mobin, and Balachandran disclose
all the subject matters claimed in claim 36, except that an integrator is
used to perform the averaging function. Shurvinton discloses a
communication device comprising an integrator 21, which has been used
to average out the amplitude variations of the incoming signal (see
paragraph 0067). In rejection of claim 36, averaging has been taught by
the previous references. Reference Shurvinton has been used to show
that averaging can be done by using an integrator and as disclosed by
Shurvinton, it would have been obvious to one of ordinary skill in the art at
the time of invention to use an integrator to determine the average of the

magnitude to reduce the error in the sampled power measurement (see

paragraph 0067).

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the

Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Leila Malek/

Examiner, Art Unit 2611

October 10, 2008

Conferees:

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